Trend Study 27-4-03

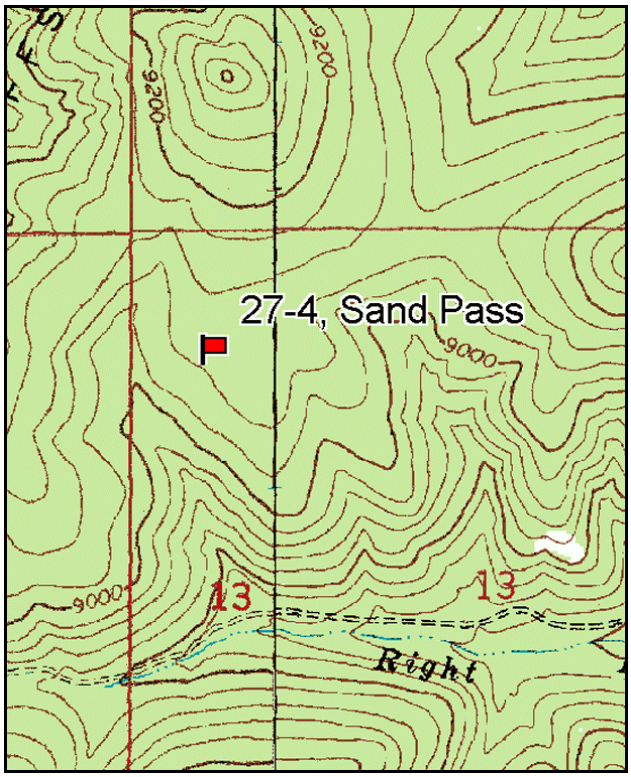
Study site name: Sand Pass . Vegetation type: Clearcut-Mixed Conifer .

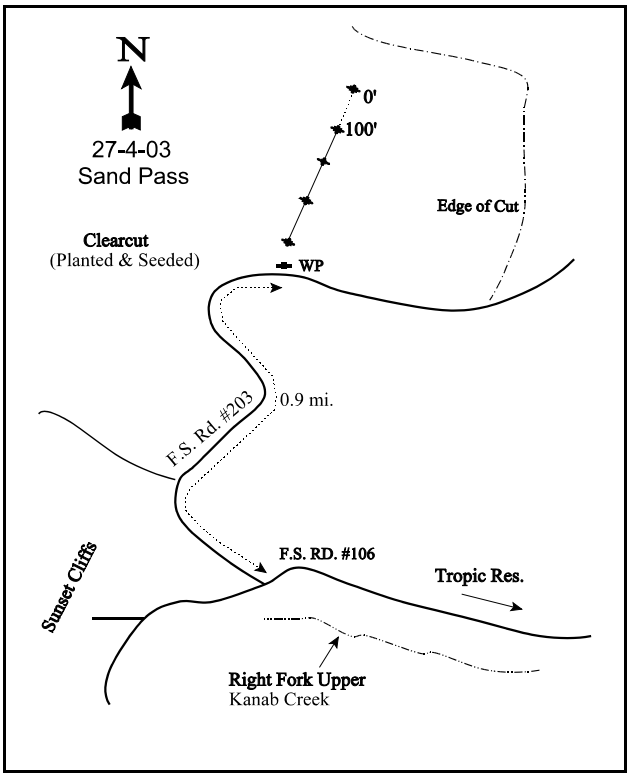
Compass bearing: frequency baseline 225 degrees magnetic.

Frequency belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft). No rebar.

LOCATION DESCRIPTION

From Badger Creek turnoff on the south end of Tropic Reservoir, travel south on the East Fork of the Sevier River Road (F.S. road 105) for about 4.35 miles to Kanab Creek. Turn right onto the Kanab Creek Road and go 4.5 miles to a fork. Bear right towards North Fork Kanab Creek and travel 2.6 miles to another fork. Bear right up a hill and drive 0.9 miles through a clearcut to the witness post (4' green fencepost) on the left side of the road. If you go too far, the road curves around the ridge at the edge of the clearcut. The transect is in the clearcut above the road. The 400-foot stake is 6 feet north of the witness post. The 0-foot stake is marked by a browse tag #7156.





Map Name: George Mountain

Diagrammatic Sketch

Township 38S , Range 5W , Section 13

GPS: NAD 27, UTM 12S 4152274 N, 378317 E

DISCUSSION

Sand Pass - Trend Study No. 27-4

This study samples a conifer forest clear cut and seeding project completed in 1972 on the slopes below Sand Pass and the Sunset Cliffs. Remnants of the mixed conifer type exist on top and in the nearby drainages. Scattered clumps of aspen are an important component of the area. Ponderosa pine and Douglas fir were transplanted, but neither species has been particularly abundant since the treatment. This study lies in the Kanab Creek allotment, although few cattle make it this far out of the drainages. The area is also used as summer range by deer and elk. The study area is typical of the high, previously heavily timbered areas of the Paunsaugunt Plateau. The transect has a southwest exposure and a moderate slope of 15% at an elevation of 9,000 feet. Pellet group transect data collected in 2003 estimated 3 elk and 25 deer days use/acre (8 edu/ha and 61 ddu/ha). Pellets were fresh and from the current summer.

Initially, there appeared to have been some soil erosion following the clear cut. Since then, vegetation and litter cover have stabilized the soil over most of the slope. The seeding of perennial grasses on the road cuts and bare areas have helped minimize excessive soil loss, although a few problem areas remain. An erosion condition class assessment rated soils as stable in 2003. Soils are derived from Wasatch limestone parent material and have moderate depth. Soil texture is a clay with a slightly acidic pH (6.5). A large concentration of rock and fragments are found throughout the profile and on the surface. Phosphorus may be limiting to plant growth at only 6.4 ppm, where 10 ppm is considered minimal for normal plant development.

The young conifers that were planted following the clear cut average 8 to 12 feet in height. Point-center quarter data from 2003 estimated 32 ponderosa pine trees/acre with an average diameter of 6.1 inches, and 90 Douglas fir trees/acre with an average diameter of 3.6 inches. A few aspen also occur on the site.

The dominant vegetation on the site is a mixture of shrubs. Total canopy cover of woody species was estimated at nearly 48% in 2003. The prevalent shrub species in order of average cover provided are currant, manzanita, snowberry, Oregon grape, Fendler ceanothus, and Wood's rose. Most of the browse on the site shows little use except for ceanothus which was moderate to heavily hedged in 1997 and 2003. Of the prevalent species, currant provides the most shrub cover with a total line intercept average cover value of 20%. Currant leaders averaged 3.7 inches of annual growth when the site was read in early August of 2003. Percent decadence was low and vigor good on all of the browse species sampled in 1997 and 2003. The moderately to heavily browsed Fendler ceanothus has a small population of 900 plants/acre estimated in 2003. They show good vigor and no decadent plants were sampled in 1997 or 2003.

The abundance of conifer and mountain browse in the area limits the productivity of herbaceous species. Although 11 species of perennial grasses have been sampled on the site, they have combined to produce 5% or less total cover since 1992. The most common native species are bottlebrush squirreltail, a *Carex*, fringed brome, subalpine needlegrass, and Letterman needlegrass. Of these, Letterman needlegrass and *Carex* significantly declined in nested frequency in 2003, while subalpine needlegrass significantly increased. The seeded species are restricted mainly to road cuts and include Kentucky bluegrass, crested wheatgrass, intermediate wheatgrass, and timothy. Forbs are moderately diverse and provide more cover on the site than grasses. Although not sampled on the transect, elkweed is common on the more open rocky openings and has been heavily used by wildlife in the past. Penstemon, Oregon fleabane, redroot buckwheat, and groundsel are often utilized when available. Wheeler's thistle has been the most abundant forb on the site in all surveys.

1992 TREND ASSESSMENT

Of the total vegetation cover on the site, the majority is provided by browse (66%). Shrub cover does not protect soils as well as herbaceous cover, especially from the effects of high intensity summer storms. Because the forb and grass nested frequency values are both declining, and percent bare ground and percent rock-pavement both increased, trend for soils is slightly down. Browse trend for this site is slightly up. Percent decadence for key species is low with good biotic potentials and good percentages of young plants indicating a healthy increasing population of shrubs. The trend for the herbaceous understory of grasses and forbs is downward. Nested frequency values for both show significant decreases, especially for the forbs.

TREND ASSESSMENT
soil - slightly down (2)
browse - slightly up (4)
herbaceous understory - down (1)

1997 TREND ASSESSMENT

The soil trend continues to be slightly down. Percent bare ground declined slightly, but this is due mainly to an increase in rock and pavement cover. Vegetative cover declined slightly and sum of nested frequency of grasses and forbs declined by 32%. In addition, litter cover has declined in consecutive readings. Trend for browse appears stable for the key species. Use remains mostly light to moderate and vigor good. Trend for the herbaceous understory is down due to a decline in the sum of nested frequency for both grasses and forbs. This will likely be a continuing trend as shrubs and trees become more dominant on the site.

TREND ASSESSMENT
soil - slightly down (2)
browse - stable (3)
herbaceous understory - down (1)

2003 TREND ASSESSMENT

Trend for soil is stable. Vegetation and litter cover are stable and bare ground remains at 21%. Erosion is not severe, and soils were given a stable rating in 2003 from an erosion condition class assessment. Trend for browse is stable. The prevalent species show mostly light use, low decadence, and average cover either increased or remained stable. Total shrub cover increased from 25% in 1997 to 38% in 2003. Due to the fact that this site represents summer range, browse are of less importance here compared to lower elevational sites. In addition, the high cover value for shrubs is inhibiting herbaceous production. Trend for the herbaceous understory is slightly down as perennial grasses continue to decline in sum of nested frequency. Forbs remained nearly stable in frequency in 2003. Tree and shrub cover is high which greatly limits the productivity of the herbaceous component. Because this is summer range for big game and also grazed by livestock, a greater emphasis should be placed on grasses and forbs. This area would be a good candidate for a prescribed burn to decrease browse cover and stimulate herbaceous species and aspen regrowth.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --
Management unit 27 , Study no: 4

Type	Species	Nested Frequency				Average Cover %		
		'87	'92	'97	'03	'92	'97	'03
G	Agropyron intermedium	a-	c52	c20	b18	.66	.12	.33
G	Agropyron trachycaulum	-	5	9	3	.06	.01	.15
G	Bromus ciliatus	b58	ab55	a35	ab40	1.02	.44	.99
G	Bromus inermis	-	5	1	-	.06	.00	-
G	Carex spp.	c67	bc44	ab42	a16	.69	.75	.58
G	Oryzopsis hymenoides	1	2	3	-	.03	.03	-
G	Phleum pratense	-	-	6	1	-	.06	.00
G	Poa fendleriana	32	30	23	21	.57	.40	.44
G	Sitanion hystrix	c202	b119	a26	a27	1.22	.25	.24
G	Stipa columbiana	a-	a6	a12	b32	.18	.02	.64
G	Stipa lettermani	b47	ab35	b39	a10	.61	.84	.22
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		407	353	216	168	5.11	2.95	3.62
Total for Grasses		407	353	216	168	5.11	2.95	3.62
F	Achillea millefolium	-	1	2	-	.00	.00	-
F	Antennaria rosea	-	-	1	1	-	.00	.03
F	Androsace septentrionalis (a)	-	a-	b9	a-	-	.02	-
F	Arabis spp.	b11	a-	a-	a-	-	-	-
F	Aster spp.	a-	a-	b46	b75	-	.80	.95
F	Astragalus spp.	5	7	9	1	.06	.10	.00
F	Calochortus nuttallii	-	-	-	3	-	-	.01
F	Cirsium wheeleri	137	110	131	116	3.85	2.95	3.68
F	Draba subalpina	a-	c72	b21	a-	.16	.04	-
F	Erigeron speciosus	c73	b55	a-	a-	1.07	.03	-
F	Frasera speciosa	c45	cd25	ab9	a1	.42	.38	.30
F	Geranium caespitosum	3	6	-	5	.04	-	.15
F	Gentiana spp.	b11	ab1	ab2	a-	.03	.03	-
F	Lithophragma	-	-	2	-	-	.03	-
F	Lomatium spp.	59	36	28	28	.18	.10	.45
F	Penstemon caespitosus	-	-	2	1	-	.03	.03
F	Penstemon spp.	ab40	b41	ab34	a16	.48	.25	.31
F	Polygonum douglasii (a)	-	-	2	-	-	.00	-
F	Senecio multilobatus	c78	b39	a-	a7	1.13	-	.07
F	Solidago sparsiflora	a11	b54	a13	b52	.63	.49	1.79
F	Taraxacum officinale	b42	a17	a23	a10	.09	.12	.24

Type	Species	Nested Frequency				Average Cover %		
		'87	'92	'97	'03	'92	'97	'03
F	Thlaspi spp.	$_{b}$100	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
F	Tragopogon dubius	9	3	-	-	.00	-	-
F	Viguiera multiflora	-	-	8	1	-	.36	.15
Total for Annual Forbs		0	0	11	0	0	0.03	0
Total for Perennial Forbs		624	467	331	317	8.20	5.74	8.18
Total for Forbs		624	467	342	317	8.20	5.77	8.18

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 27 , Study no: 4

Type	Species	Strip Frequency			Average Cover %		
		'92	'97	'03	'92	'97	'03
B	Amelanchier alnifolia	4	2	1	.06	.03	.18
B	Arctostaphylos patula	10	15	11	1.00	3.34	5.15
B	Ceanothus fendleri	11	7	10	.73	2.52	2.85
B	Chrysothamnus parryi attenuatus	0	0	0	-	.03	-
B	Clematis columbiana	3	8	6	1.45	.48	.27
B	Gutierrezia sarothrae	0	0	1	-	-	-
B	Haplopappus zionis	10	0	0	.21	-	-
B	Juniperus communis	3	3	3	.33	.15	1.25
B	Mahonia repens	90	89	86	4.41	3.72	4.15
B	Pachistima myrsinites	36	30	23	1.03	1.10	.93
B	Pinus flexilis	1	0	0	-	-	-
B	Pinus ponderosa	3	0	1	1.61	-	.78
B	Populus tremuloides	1	4	1	-	-	-
B	Pseudotsuga menziesii	12	10	8	.37	-	4.52
B	Ribes cereum inebrians	44	40	37	7.78	7.13	10.85
B	Rosa woodsii	63	44	45	3.30	2.21	2.07
B	Symphoricarpos oreophilus	45	37	41	4.01	4.21	5.03
Total for Browse		336	289	274	26.34	24.95	38.09

CANOPY COVER, LINE INTERCEPT --
Management unit 27 , Study no: 4

Species	ercent Cover	
	'97	'03
Arctostaphylos patula	-	6.81
Ceanothus fendleri	-	1.14
Clematis columbiana	-	.11
Juniperus communis	-	1.31
Mahonia repens	-	2.66
Pachistima myrsinites	-	2.06
Pinus ponderosa	-	.20
Populus tremuloides	3.20	2.00
Pseudotsuga menziesii	1.79	5.53
Ribes cereum inebrians	1.60	20.10
Rosa woodsii	-	1.73
Symphoricarpos oreophilus	-	4.00

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 27 , Study no: 4

Species	Average leader growth (in)
	'03
Ribes cereum inebrians	3.7

POINT-QUARTER TREE DATA --
Management unit 27 , Study no: 4

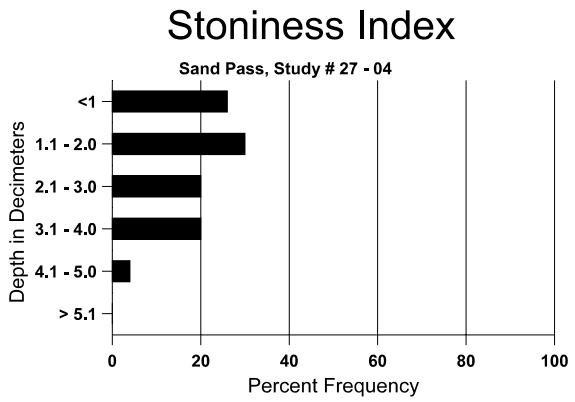
Species	Trees per Acre	Average diameter (in)
	'03	'03
Pinus ponderosa	32	6.1
Pseudotsuga menziesii	90	3.6

BASIC COVER --
Management unit 27 , Study no: 4

Cover Type	Average Cover %			
	'87	'92	'97	'03
Vegetation	6.00	36.34	34.04	44.14
Rock	4.50	8.79	8.46	10.17
Pavement	1.25	0	3.47	.93
Litter	66.75	53.79	47.12	49.04
Cryptogams	.50	0	.45	0
Bare Ground	21.00	23.40	20.55	20.86

SOIL ANALYSIS DATA --
Management unit 27, Study no: 4, Study Name: Sand Pass

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.6	50.7 (16.0)	6.5	31.0	27.2	41.8	3.4	6.4	115.2	0.6



PELLET GROUP DATA --
Management unit 27 , Study no: 4

Type	Quadrat Frequency '92	'97	'03
Rabbit	8	5	-
Elk	2	1	1
Deer	16	20	8

Days use per acre (ha) '03
-
3 (8)
25 (61)

BROWSE CHARACTERISTICS --
Management unit 27 , Study no: 4

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Amelanchier alnifolia											
87	**0**	-	-	-	-	-	0	0	0	0	-/-
92	**120**	-	80	-	40	-	0	0	33	0	-/-
97	**120**	-	100	20	-	-	0	17	0	0	14/8
03	**40**	-	40	-	-	-	0	100	0	0	7/11
Arctostaphylos patula											
87	**133**	-	-	133	-	-	0	0	0	0	23/71
92	**220**	40	20	200	-	-	0	0	0	0	-/-
97	**680**	80	20	640	20	-	0	0	3	3	22/55
03	**280**	-	-	240	40	20	0	0	14	14	23/70

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Ceanothus fendleri											
87	**66**	-	-	66	-	-	0	100	0	0	17/65
92	**4260**	300	1880	2260	120	-	56	33	3	1	-/-
97	**400**	-	-	400	-	-	0	40	0	0	9/47
03	**900**	-	-	900	-	-	69	0	0	0	11/36
Clematis columbiana											
87	**466**	133	400	66	-	-	0	0	-	0	29/4
92	**200**	40	180	20	-	-	0	0	-	0	-/-
97	**240**	-	100	140	-	-	0	0	-	0	18/25
03	**180**	-	-	180	-	-	0	0	-	0	11/10
Gutierrezia sarothrae											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**20**	-	-	20	-	-	0	0	-	0	-/-
Haplopappus zionis											
87	**0**	-	-	-	-	-	0	0	0	0	-/-
92	**2220**	1180	1440	760	20	-	58	22	1	3	-/-
97	**0**	-	-	-	-	-	0	0	0	0	-/-
03	**0**	-	-	-	-	-	0	0	0	0	-/-
Juniperus communis											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
92	**60**	80	-	60	-	-	0	0	-	33	-/-
97	**120**	-	20	100	-	-	0	0	-	0	16/37
03	**60**	-	20	40	-	-	0	0	-	0	19/50
Mahonia repens											
87	**36799**	6266	36133	666	-	-	0	0	0	0	4/4
92	**35440**	6060	23220	12040	180	-	2	.05	1	0	-/-
97	**13300**	40	3380	9920	-	-	0	0	0	.75	4/5
03	**16440**	-	360	16080	-	-	0	0	0	0	4/5
Pachistima myrsinites											
87	**1933**	600	1933	-	-	-	0	0	0	0	-/-
92	**6300**	660	5640	640	20	-	6	4	0	0	-/-
97	**2500**	60	860	1640	-	-	0	0	0	0	5/6
03	**1560**	-	40	1520	-	-	5	0	0	0	2/4

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Pinus flexilis											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
92	**20**	-	-	20	-	-	0	0	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	0	-/-
Pinus ponderosa											
87	**266**	-	266	-	-	-	0	0	-	0	-/-
92	**60**	20	60	-	-	-	0	0	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**20**	-	-	20	-	-	0	0	-	0	-/-
Populus tremuloides											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
92	**20**	20	-	20	-	-	0	0	-	0	-/-
97	**180**	-	80	100	-	-	22	0	-	33	-/-
03	**100**	-	-	100	-	-	0	0	-	0	-/-
Pseudotsuga menziesii											
87	**66**	-	66	-	-	-	0	0	-	0	-/-
92	**240**	-	240	-	-	-	17	0	-	0	-/-
97	**220**	-	160	60	-	-	0	0	-	9	-/-
03	**160**	-	80	80	-	-	0	0	-	0	-/-
Ribes cereum inebrians											
87	**1733**	-	533	1200	-	-	4	0	0	4	35/27
92	**1660**	760	440	1140	80	-	33	12	5	1	-/-
97	**1620**	20	60	1500	60	-	12	0	4	1	53/67
03	**1140**	-	40	1060	40	20	7	0	4	2	51/57
Rosa woodsii											
87	**1932**	66	1266	666	-	-	41	3	0	0	9/6
92	**15020**	1400	13540	1320	160	-	25	3	1	.66	-/-
97	**5900**	80	4280	1620	-	80	1	0	0	0	11/9
03	**4280**	-	420	3780	80	-	6	0	2	0	8/8
Symphoricarpos oreophilus											
87	**1066**	66	200	733	133	-	50	38	12	19	15/27
92	**3080**	1100	1380	1420	280	-	26	15	9	4	-/-
97	**2120**	40	320	1780	20	-	9	0	1	0	18/33
03	**1500**	-	280	1180	40	-	3	4	3	0	15/32